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of *Stachytaxus*, and by implication for the similar relationship of *Palissya*. The only real evidence for the affinity of these two genera with the Taxineae seems to rest on the possible presence of an epimatium in connection with the seeds. It seems not improbable that they are really representatives of an araucarian stock different from any now in existence. Some of the later mesozoic Araucarineae possess both the biovulate cone scale and the flaring integument of the genera under discussion. Present indications are that all the mesozoic conifers will ultimately be arranged either under the Abietineae or the Araucariineae in the broader sense.—E. C. JEFFREY.

**Orchid flowers and formative stimuli.**—FITTING's work on the effect of pollination and other stimuli upon the postfloration behavior of orchid flowers has been reviewed in this journal.<sup>18</sup> In a second paper,<sup>19</sup> he gives an account of further experimentation of the same kind, and concludes that the changes induced in the perianth, gynostemium, and ovary are at most six, namely: (1) shortening of the life of the perianth, (2) lengthening of the life of the perianth, (3) closing of the flower, (4) swelling of the ovary and gynostemium, (5) fading of the perianth, (6) greening of the ovary and perianth. Each of these may result separately or with several others, in various combinations. Although it seems probable that the influence of the pollen is due to a chemical substance soluble in water and alcohol, FITTING was unable to isolate it in pure form or to identify it. It was determined, by extracting pollen of *Cattleya Trianaei* with water and hot alcohol, that this chemical substance is not found inside the pollen grain, but merely adheres to it and can be removed without injury to the pollen. By using the pollen from which this substance has been removed, the effects of the pollen tube alone can be studied, when it is found that the tube produces the same results as the active substance. This is not due to the substance secreted by the tube or carried down from the pollen grain, but to an unknown factor.—R. CATLIN ROSE.

**A new case of apogamy.**—*Burmannia coelestis*, as described by ERNST,<sup>20</sup> furnishes a case of apogamy somewhat different from any hitherto reported. From the cells of the egg apparatus of an eight-nucleate embryo sac with diploid nuclei, one and often two and sometimes three embryos are produced. The formation of a tetrad of megaspores is either irregular or completely suppressed, as is already known to be the case in most apogamous forms previously described. No synapsis stage or heterotypic mitosis was observed. The number of chromosomes was not determined, but is greater than in normally fertilized species of *Burmannia*. The anticipated irregularities in the pollen were found, and the

<sup>18</sup> BOT. GAZETTE 47:479. 1909.

<sup>19</sup> FITTING, H., Weitere entwickelungsphysiologische Untersuchungen an Orchideenblüten. Zeitschr. Bot. 2:225-267. 1910.

<sup>20</sup> ERNST, A., Apogamie bei *Burmannia coelestis* Don. Ber. Deutsch. Bot. Gesell. 27:157-168. pl. 7. 1909.

fact that fertilization is very easily demonstrated in normally fertilized species makes the writer confident that the failure to find it in *B. coelestis* is evidence that it does not occur. The figures show only topography, without any details of the chromatin situation. A careful counting of chromosomes at critical stages, and a few figures at the stages which show whether a form is apogamous or not, would have extended the paper but little, and would have made unnecessary any further work upon the subject; but as it is, a forthcoming paper will deal with these details, the present one being preliminary.—CHARLES J. CHAMBERLAIN.

**Spermatogenesis in *Mnium*.**—As a result of their studies of several species of mosses, the Drs. VAN LEEUWEN-REIJNVAAN reported that in the last division of the spermatogenous cells a second numerical reduction of chromosomes takes place. In a species of *Mnium* having eight chromosomes in the last division, two long and two short chromosomes pass to the daughter cells. WILSON,<sup>21</sup> studying *Mnium hornum*, in a preliminary note announces that no such reduction is found, and that the gametophyte number is constant throughout spermatogenesis. The resting nucleus before the final division is quite large and contains a small nucleolus. A continuous spirem is not present, and the chromatic material appears as a number of small masses from which the chromosomes are formed. In the final division the axis coincides with the long axis of the cell, there being no diagonal division. Six chromosomes can easily be distinguished in the last division, and it is clear that no such reduction as described by the Drs. VAN LEEUWEN-REIJNVAAN takes place in *Mnium hornum*.

It is to be hoped that the final paper will also deal with fertilization, for many investigators find some difficulty in accepting the account given by the Drs. VAN LEEUWEN-REIJNVAAN.—W. J. G. LAND.

**Hydrogen bacteria.**—The epoch-making researches of WINOGRADSKI (1887-) on the sulfur, nitrite, and nitrate bacteria established the important fact of the existence of non-chlorophyll organisms that are obliged to manufacture their organic food by energy obtained from the oxidation of various simple inorganic substances. In 1906 various investigators reported the existence of bacteria that can oxidize hydrogen as the source of energy for assimilating CO<sub>2</sub>. The forms were shown to be capable of using organic food as well, and are therefore facultatively autotrophic, in contrast to the obligate autotrophic forms studied by WINOGRADSKI. LEBEDEF<sup>22</sup> now makes a preliminary report of the main results of an extensive study of the metabolism of these forms. The fixing of 100 c.c. of CO<sub>2</sub> requires the oxidation of 500-1500 c.c. of H<sub>2</sub>. The oxygen for the process is best obtained from atmospheric oxygen, but in absence of it nitrates can be decomposed as its source. The oxidation of H<sub>2</sub> still continues in the presence of organic food, but no CO<sub>2</sub> is fixed in that case.—WILLIAM CROCKER.

<sup>21</sup> WILSON, M., Preliminary note on the spermatogenesis of *Mnium hornum*. *Annals of Botany* 24:235. 1910.

<sup>22</sup> LEBEDEF, A. J., Ueber die Assimilation des Kohlenstoffes bei Wasserstoff oxydierenden Bakterien. *Ber. Deutsch. Bot. Gesell.* 27:598-602. 1910.